the old plates with defective scale value, we need only substitute for the headings,

	25° 0′,	25° 10′,	25° 20′,	25° 30′,	25° 40′, &c.
the values	25° 56′,	26° 6′,	26° 15′,	26° 25′,	26° 34′, &c.

and the tables are then adapted to the old plates.

For the formation of $\eta=(\delta-\mathrm{D})+\frac{1}{4}(\alpha-\mathrm{A})^2 \sin 2\mathrm{D}$, the second term will not generally need correction, and the first term can be multiplied by the proper factor by means of a small table.

The Use of a Coloured Screen in Photographing the Corona during an Eclipse. By W. Shackleton, A.R.C.Sc.

It has long been known that the distribution of *coronium* throughout the corona was not concurrent with the streamers themselves, the '1474 K' line often being as strong in rifts as elsewhere. From observations made at the eclipse of 1898 both Mr. Newall and Mr. Fowler pointed out that the image of the corona, viewed in the monochromatic light of the green corona line, had decided variations from that seen or photographed directly. In the main the image of the former corresponds to an *inner corona*; this *inner corona* not being merely a sort of under-exposed picture of the whole, but one having a delineation of its own which does not agree with the corona proper. If, then, it were possible to photograph the corona in '1474 K' light alone, we should determine the distribution of *coronium* throughout the corona.

The most obvious way of photographing the corona in the light of the green corona line would be, of course, to use some spectroscopic method; but I wished rather to employ simple apparatus, and from the following considerations I think it possible this may be done by the use of a camera provided with a suitably coloured screen. It will be seen, on examining the photographs taken with prismatic cameras or other spectroscopes during the eclipses of 1893, 1896, and 1898,* that the light of the corona consists principally of continuous spectrum, the line spectrum, with the exception of '1474 K,' being feeble. This line, however, is strong enough to give good decided impressions, although falling in a region of weakness on the isochromatic plates used; indeed, it is so intense that I have seen it recorded on plates supposed to be insensitive to the green.

Referring again to the above photographs, it appears that the continuous spectrum has been photographed to a greater distance from the Sun's limb than has the line spectrum.

* *Phil. Trans.*, A, vol. clxxxvii. (1896), Plates 11, 12; vol. clxxxix. (1897), Plate 9. *Monthly Notices*, R.A.S., vol. lviii., Appendix, Plate 9.

A photograph of the corona on an isochromatic plate sensitive to the rays from yellow to violet, then, is built up of light represented by the continuous spectrum between λ 5900 and λ 3800, together with the light of the line spectrum, represented chiefly by the lines λ 5303 ('1474 K'), λ 4231, λ 3987, the two latter being weak in comparison with the former.

Supposing, therefore, by the use of an absorbing medium we could limit the spectrum to within a short distance on either side of '1474 K,' say by the use of the coloured screen described below, something like 90 to 95 per cent. of the continuous spectrum would be cut off, whilst only a small percentage of line giving light would be absorbed.

Hence by taking a photograph through such a screen we should have the two images, one from the continuous spectrum between λ 5320 and λ 5200, the other from '1474 K' light superposed.

But from the fact that the '1474 K' line is so very intense, and also that the image in this light is of less extent than the ordinary coronal image, it appears very probable that the corona thus photographed would be chiefly due to the *coronium* radiations; the image from the continuous spectrum being relatively weak and spread over a large area, would consequently be too feeble to register in an eclipse of moderately short duration.

From experiments I have made I found it difficult to procure a simple green, but by using two screens stained with the aniline dyes, methylene blue and tartrazine respectively, a resulting colour is produced which allows a narrow band of green light to filter through, the yellow, blue, and violet rays being suppressed. The position of the green line from the corona falls within this band.

The following table shows where the absorption takes place in each case :—

Absorbing Medium.	Edge of Absorption Band. λλ	Rays Absorbed.
Tartrazine—		
(1) Light stain	5100	Green, and more refrangible.
(2) Deep ,,	5290	,, ,, ,,
Methylene blue—		
Medium stain	5320	Yellow, and less refrangible.

It is necessary to use a yellow screen of moderate depth of tint to insure the blue light being well cut off, therefore we may say that the band of green light which is unabsorbed extends from λ 5200 to λ 5320. This being the case, only about 6 per cent. of the light-giving continuous spectrum could pass through, whilst practically all the light of the green corona line would be unopposed.

No doubt some of the green commercial screens used in three-colour photography would be found suitable, but so far I have not tested any of these.

I am indebted to Dr. Morgan, of the Royal College of Science, for samples of various dyes.

NOTE.—Since the above was communicated to the Society Professor Langley, in a letter to *Nature*,* describes the great intensity of the inner corona, and how in consequence of this brilliance he was able to see *Mercury* in transit projected on the bright background, before it reached the Sun's limb. During the eclipse of 1878 he made a brief telescopic examination of the inner corona, and found it to be "a surprisingly definite filamentary structure . . . . not disposed radially, or only so in the rudest sense, sharpest and much the brightest close to the disc, fading rapidly away into invisibility at a distance of 5′ or more (possibly in some cases ten)."

This description of the inner corona agrees well, in respect to extension, brightness, and non-coincidence of the ordinary radial streamers, with the image of the corona seen in the light of the green coronal line.

Professor Langley further says "that while most interesting photographs of the inner coronal structure have recently been made, yet that this feature has not yet been done justice to even in the best of them I have seen, and that it perhaps cannot be, with our present means."

It would be interesting to see if by the use of a coloured screen this structural detail could be brought out more distinctly.

In a lecture delivered at the Society of Arts, 1900 March 12, on the "Photography of Colour," Mr. E. Sanger Shepherd states that he rejects liquid solutions and stained glass as unsuitable for colour filters, and pronounces in favour of aniline dyes sealed up in gelatine or collodin, between glasses; by experiment a number of these dyes have been found to be of fair permanency.

The Maximum Duration Possible for a Total Solar Eclipse. By C. T. Whitmell, M.A., President of the Leeds Astronomical Society.

Total solar eclipses are among the grandest of natural phenomena. Prolonged totality is very uncommon, and its rarity invests it with exceptional interest.

The eclipse of Thales on 585 B.C. May 28, and that visible in Scotland on 1433 A.D. June 17, were remarkable for prolonged totality.

To come to more recent times, the eclipse of 1868 August 17 is said to have exceeded both those just referred to.

By the kindness of Dr. Downing an estimate of the duration of totality of this 1868 eclipse has been made, and—for local

* Vol. lxi. p. 443, 1900 March 8.